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ABSTRACT

A study examined the type of computer software that is best suited to teach high technology skills to vocational students. During the study, 50 manufacturers of computer software and hardware were sent questionnaires designed to gather data concerning their recommendations in regard to: software to teach high technology skills to vocational students; software programs for academically gifted students and for slow learners; courseware to teach math and English skills to middle and high school students and also to college students; and company college gift policies. Eighteen completed surveys (36 percent of those originally mailed out) were usable for the study. The individual programs recommended for use in each of the aforementioned areas were compiled into lists organized by skill area. It was concluded that the Apple Computer Company is addressing the high technology needs of students. The Unix System V, a trademark of AT&T Bell, was also determined to be a state-of-the-art system in the eyes of those surveyed. This multipurpose system for text processing, database management, and networking is used by many major universities and industries across the Nation. (The addresses of companies contacted during the survey is appended to this report.) (MN)

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THE USE OF COMPUTER SOFTWARE TO TEACH HIGH TECHNOLOGY SKILLS TO VOCATIONAL STUDENTS

A RESEARCH PRACTITIONER PAPER
PRESENTED TO THE AVA T & I EDUCATIONAL
RESEARCH COMMITTEE PROGRAM

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THE USE OF COMPUTER SOFTWARE TO TEACH HIGH TECHNOLOGY SKILLS

Vocational education teachers are bewildered when it comes to selecting the appropriate computer software to meet the needs of their students. Brand name companies such as Apple, Commodore, IBM, Radio Shack, etc., are flooding the market with educational software for school systems as well as for personal enrichment. These appealing and competitive companies make it difficult for teachers to select the computer software that would best meet their needs. Vocational teachers may find this study to be an asset in resolving some of the difficulties in selecting educational software to teach high technology skills in the classroom.

PURPOSE OF THE STUDY

This study was designed to investigate the type of computer software that is best suited to teach high technology skills to vocational students. In addition, the study addressed the following questions:

1. What software programs would you recommend for the academically gifted and slow learners?
2. What software programs would you recommend to teach math and English skills in:
   a. Middle grades (6th through 8th)
   b. High school (9th through 12th)
   c. College level (1st year)
3. Does your company have a college gift policy; if yes, what are the procedures?

METHODOLOGY AND INSTRUMENTATION

The survey method was used in gathering data for this study. Fifty (50) computer software and hardware companies were sent a green two—page questionnaire that addressed eight questions concerning software for high technology programs. A green questionnaire was used to attract the participants' attention in responding to the survey. Initially, the survey instrument addressed ten questions. However, after field testing it with a panel of judges, the instrument was reduced to eight questions.

Three weeks after the survey was administered, a follow—up letter and a yellow copy of the instrument was sent to those participants who had not responded. A change was made in the color of the instrument, from green to yellow, to increase the possibility of higher returns. In addition, changing the color of the suvey instrument made it easier to tabulate the findings.

Forty—six percent (23 of 50) of the participants returned the questionnaire. However, only 36% (18 of 50) was usable for the study. Although the returns were low, some interesting and noteworthy findings were revealed.

FINDINGS

The participants were given an opportunity to respond freely concerning the type of computer software they felt was appropriate to teach high technology skills to vocational students. When returning the questionnaire, some of the participants enclosed a copy of their company's catalogue and made reference to some questions: "see catalog". Therefore, in order to maintain objectivity, the author randomly selected educational software from the catalogues.

QUESTION ONE

What educational software do you have for high school students enrolled in Industrial Education and High Technology Programs?

RESPONSES

1. "Construction Estimator" for the IBM, Apple IIe and MacIntosh
2. "The IBM PC Teach Program, The Multiplan Teach Program and the Database II Teach Program"
3. "Basic and Pascal Compilers"
4. "3-D Computer Aided Design"
5. "Keys" -- a Learning/game package for CBM8032
6. "Unix TM System V" developed by AT&T Bell Laboratories
7. "The Writer's Workbench" developed by AT&T Bell Laboratories
8. "Basic Electricity" -- problem solving techniques in electrical circuits for Apple computers
9. "SERIX" -- high performance Unix System V for the IBM Series/I
10. "Newton: Satallite Orbits" -- Newton's Laws, gravitation, velocity for the PET and TRS-80 computers

QUESTION TWO

What software programs would you suggest for students who are considered slow learners?

RESPONSES

1. "Remedial Elementary and Intermediate Mathematics Software Library Subscription Series" for Apple, PET, Commodore 64, TRS-80 I/III and Atari
2. "Syllables" -- student sees a word on screen and is asked to separate the word into syllables by moving a marker beneath the word. Apple, PET, Commodore 64, TRS80 III/I and Atari

3. "Concentration" -- develop memory skills through motivated repetition. Apple, PET, Commodore 64, TRS80 I/III and Atari

4. "Language Practice" -- skills with synonyms, antonyms and/or translation between two languages, Apple, PET, Commodore 64, TRS-80 I/III and Atari

5. "Our Bodies" -- very simple, basic approach to the different systems in our bodies and what each one does. Apple II Plus and Apple IIe

6. "The Career Planning System" (CPS) developed by the National Center for Research in Vocational Education -- The Ohio State University

QUESTION THREE

What software programs would you recommend for students who are considered academically gifted and talented?

RESPONSES

1. "Triple Brain Trust, Apple Graphics Games, and Movie Maker" for the IBM and Apple II and IIe

2. "Decimals" -- adding, subtracting, multiplying and dividing. An error analysis is given after each problem and at the end of each set. Apple 48K

3. "Laboratory Simulations in Atomic Physics" -- simulate classic experiments and are applicable to any general physics course. Apple, only.

4. "Algebra Drill & Practices" -- nine drills covering algebraic fractions, percentages, equations of lines, simplification of algebraic expressions, and word problems. Apple

5. "Chemistry: Organic Nomenclature" -- provides practice with names and structures and organic compounds. Apple, TRS-80, PET/CBM

6. "Biology: Population Growth" -- three models of population growth: geometric growth, doubling time and logistic growth. Apple

QUESTION FOUR

What software programs would you suggest to teach math and English skills in middle grades, high school and the first year of college?

RESPONSES

1. Students in grades 6–12 would use similar software as indicated in the responses given for question three.

2. College freshmen can be challenged by using:

   a. "Discovery Learning in Trigonometry" ––trigonometric functions, amplitude, period, phase shift and polar coordinates. Apple

   b. "Matrix Algebra" –– elementary matrix operations (addition, subtraction, scalar and matrix multiplication, inversion), solution of systems of equations. PET

   c. "Surfaces for Multivariable Calculus" –– surfaces in three–dimensional space, graphs of functions of variables, perspective, spherical coordinates, directional derivatives and quadric surfaces. Apple

   d. "English: Basic Mechanics" –– a series of five modules with 100 lessons covering the fundamentals of English grammar and punctuation. Apple

   e. "Exploratory Data Analysis" –– presents selected basic techniques of exploratory data analysis, illustrates their application to real data. Apple

QUESTION FIVE

What software programs do you recommend for teaching Agriculture/ Horticulture, Health Occupations Areas, Home Economics, and Industrial Arts?

RESPONSES

Agriculture/Horticulture

1. "Family Identification" –– reviews the characteristics of 74 North American flowering plant families. The program prompts students to enter the name of a family and then lists the characteristics of that family: floral formula, sap, growth habit, etc. Apple

2. "COMPETE: Plant Competition" -- seven investigations that deal with the effects of crowding on plant growth, measurement growth, simulated growth in a mixture, interaction below plant interaction. PET and TRS-80

3. "Agriculture" -- study of nine agricultural belts: corn, cotton, wheat, etc. Afterward, the student is given 10 minutes with the program to see how man questions they can answer as part of their grade for the unit. 8K PET

Health Occupations Education

1. "The Human Body" An Overview" -- Part I, Introduction to the Human Body, The Muscular System, The Digestive System and The Respiratory System. Part II, The Skeletal System, The Circulatory System, The Nervous System and a review test. 16K PET

2. "Genetics" -- A geneology (family tree) will appear on the screen. The computer will ask the student if certain types of genetic inheritance could produce such a geneology of a trait. A written explanation is printed at the bottom of the screen. 8K PET, CB2

3. "The Human Skeleton" -- A bone to pick, major skeletal bones, joints, ligaments and cartilage, review and test. 16K PET

Home Economics

1. "Counting Calories" -- the program asks for the name of a recipe to be examined. The student enters ingredients from the recipe one at a time. The screen displays fraction/decimal equivalents to determine the calories per serving and reports which offerings are least fattening. Apple, PET, Commodore 64, TRS-80 I/III and Atari

2. "Microcosm I - Calories - Food and Calories - Ingredients" -- contains the caloric values of more than 250 of the most common foods. Enter the foods and the computer will display the total caloric content of your meal. 32K TRS-80

Industrial Arts

1. "Basic Math Competency Skill Drills" -- each program contains several examples in a wide range of types and levels of difficulty. The student is guided through a random selected problem and cannot proceed until each step is done correctly.

2. "Photography" -- sixteen programs that describe basic photographic techniques, including Light 1 - The Nature of Light; Light 2 - Electro-magnetic Spectrum; Light 3 - Basic Properties of Light; Light Meter Method; Negative Exposure, etc. 8K PET and 2040 diskdrive

3. "Electricity" -- explanations of electrons, filaments, static and current electricity. Safety rules for electricity are stressed. Game follows. Apple II Plus, Apple IIe, Commodore PET, 32K and 64K

4. "Delta Drawing" -- fundamentals and advanced techniques in drawing. Programs that illustrate basic drawing, text and graphics, scaling commands, random drawings, moving your drawings, symmetrical drawings, and dynamic drawings. IBM PC - Spinnaker

QUESTION SIX

In the past, has your company donated software to any of the following: _____elementary schools; _____middle schools; _____high schools; _____community colleges; or _____universities?

RESPONSES

Fourteen percent (7 of 50) indicated that they had donated software to elementary and secondary schools. However, only 8% (4 of 50) had donated software to community colleges and universities.

QUESTIONS SEVEN & EIGHT

Does your company have a college gift policy; if yes, what are the procedures?

RESPONSE

Only 6% (3 of 50) of the computer companies surveyed indicated that they had a college gift policy:

1. Hayes Microcomputer Products, Inc.
   5923 Peachtree Ind. Blvd.
   Norcross, GA 30092

2. Quality Educational Designs
   P. O. Box 12486
   Portland, OR 97212

3. Apple Computer, Inc.
   Foundation for the Advancement of Computer Aided Education
   20525 Mariani Avenue
   Cupertino, CA 95014

CONCLUSIONS AND DISCUSSION

The results indicated that the Apple Computer Company is addressing the high technology needs of vocational students. Appie, a leading company in micro-computers, has a software library of more than 10,000 business, entertainment and educational programs. They (Apple) are very popular in elementary and secondary school systems. In addition, post secondary institutions are finding that the Apple Writer II is a useful software for students to write term papers and technical reports.

Another software that is considered by computer specialists to be the State-of-the-Art is Unix System V, a multipurpose system for text processing, database management and networking. Unix System V, a trademark of AT&T Bell Laboratories, is used by many major universities and industries throughout the country. Harvard, MIT, North Carolina State, etc., are examples of the universities using Unix operating system; IBM, Radio Shack, Northern Telecommunications, etc., are examples of the industries.

SURVEY PARTICIPANTS

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ABBREVIATED VITA

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Dr. Farmer is currently an associate professor of Industrial & Technical Education at North Carolina State University. His primary responsibilities are teaching, research, student advisement, editor of the OCCUPATIONAL EDUCATION FORUM, a national refereed journal and minority coordinator for the School of Education.

Before going to N. C. State University, Dr. Farmer was an associate professor of Industrial Technology at North Carolina A&T University. Prior to that, he was an assistant professor in the Department of Vocational Education at Temple University, Philadelphia, Pennsylvania. During the summers of 1982, '83 and '84, he worked as a Special Technical Assistant to AT&T Document Development Organization in Winston-Salem, North Carolina. He began his teaching career as a Building Trades Instructor from 1971 to 1974 at the Vocational Preparatory School and Pembroke High School in Hampton, Virginia.

Dr. Farmer has worked extensively with school districts, government agencies, and other universities as a consultant in Technical Report Writing, Vocational, Industrial & Technical Education, Special Needs Programs and Programmatic Evaluation.

His other professional experience includes that of being an Educational Liaison for the 173rd Airborne Brigade in the Republic of South Vietnam. During such time, he was awarded the Army Commendation and Bronze Star Medals.

Dr. Farmer received the Doctor of Education degree from The Pennsylvania State University in Vocational-Industrial Education. Prior to that he obtained a Master of Arts degree from Hampton Institute in Educational Administration and Supervision, and a Bachelor of Science degree in Industrial Education from Norfolk State University.

Dr. Farmer holds membership in several national professional organizations. He has conducted research and written publications on various aspects of Vocational-Industrial Education.

Dr. Farmer and his wife, Barbara, have two sons and a daughter.